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COMMUNICATIONS

THE DIVERSITY OF CATEGORICITY WITHOUT DELAY

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1. PRELIMINARIES

We continue the systematic study of fully primitive recursive structures initiated in [1]. Informally, an algebraic structure is fully primitive recursive (f.p.r.) if most of the structure can be computed "now," i.e., without any unbounded delay. Such structures tend to have algorithmically feasible presentations in the sense of [2, 3]. Eliminating unbounded search is one of the key difficulties that we have to face when trying to transform a Turing computable (constructive) structure into a polynomial-time one [4, 5]. Our approach is designed to isolate and study this major difficulty.

Formally, $\mathcal{B} = (\omega; f_1, \ldots, f_k, P_1, \ldots, P_n)$ is an f.p.r. presentation of a countably infinite $\mathcal{A} = (A; g_1, \ldots, g_k, R_1, \ldots, R_n)$ if $\mathcal{B} \cong \mathcal{A}$ and functions $f_1, \ldots, f_k$ and predicates $P_1, \ldots, P_n$ are primitive recursive. Note that Alaev [6] has recently suggested a similar approach.

Recall that a countably infinite structure is computably categorical (autostable) if it has a unique (Turing) computable presentation up to computable isomorphism. It is natural to

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